



# CDF Beam width measurement

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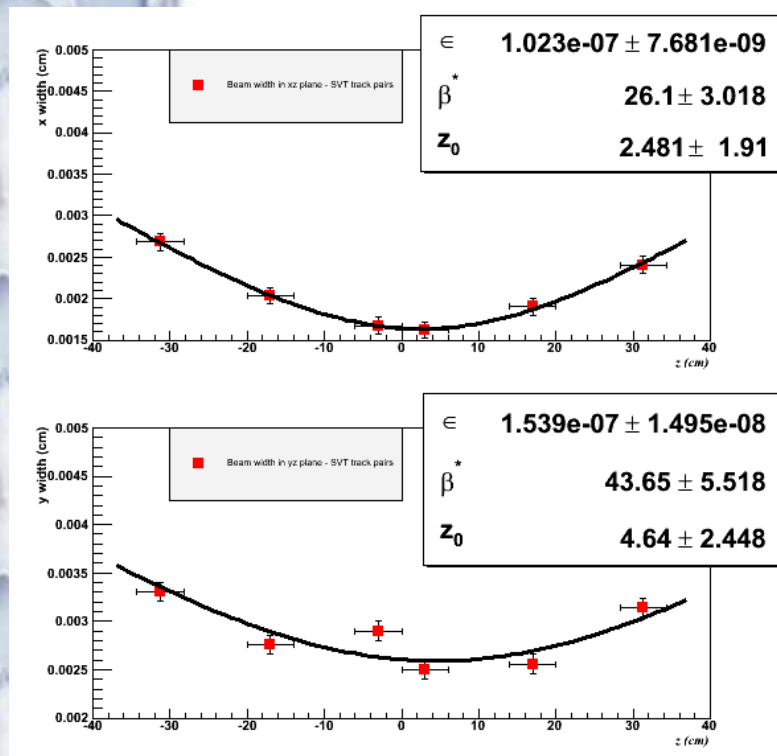
# Outline

- Studies of online beam width fit.
- Comparison of beam width between on/off-line
- History plot
- Store 4556 – Moving IP waist position during store.
- Barrel2 outlier study with MC.
- Store 4514 – Beam parameter evolution with time.

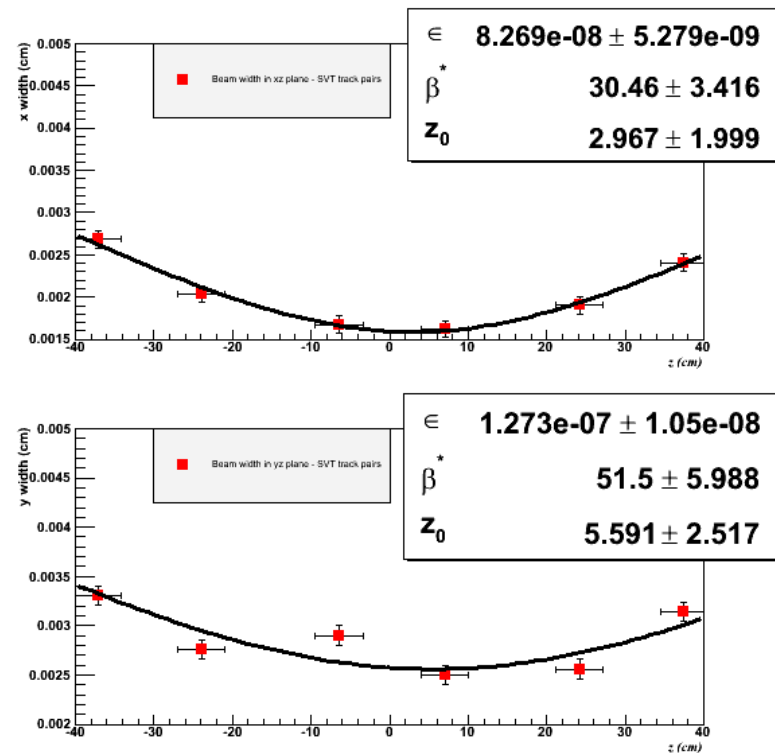
# Online beam width fit (1) – store 4556

✚ **New z template** is calculated based on Silicon Vertex Trigger information.

Previous

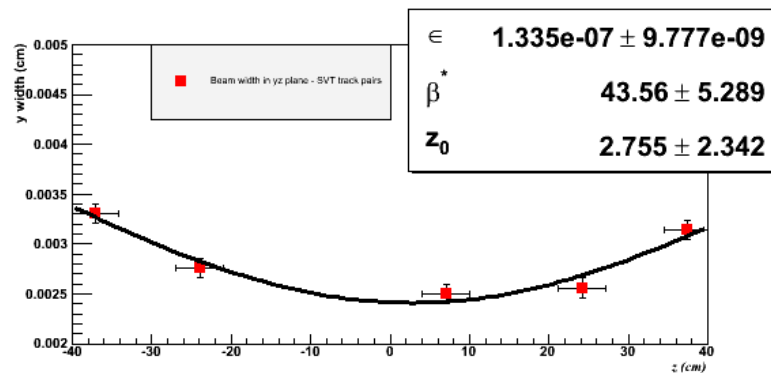
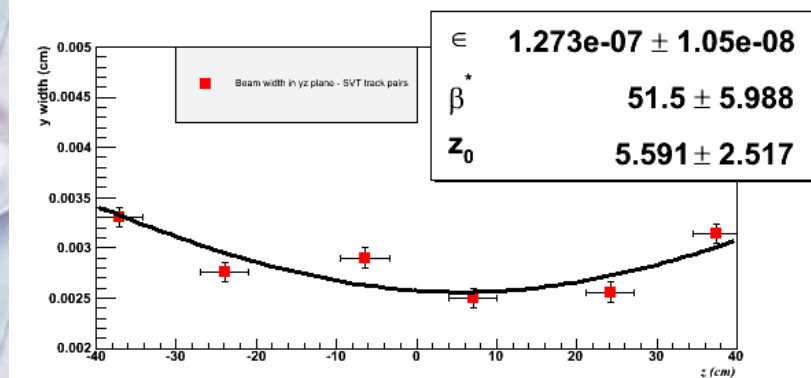
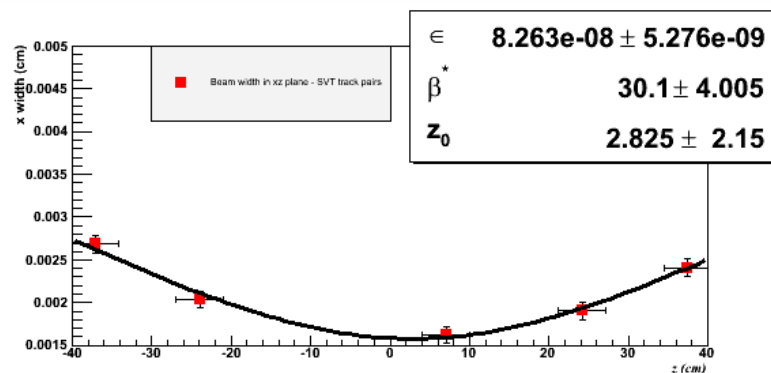
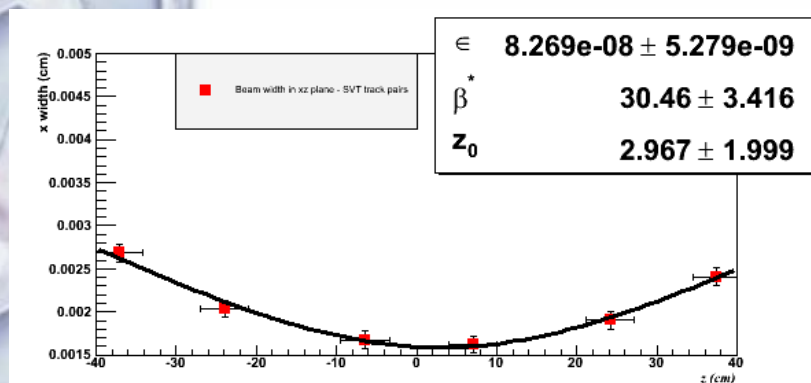


New



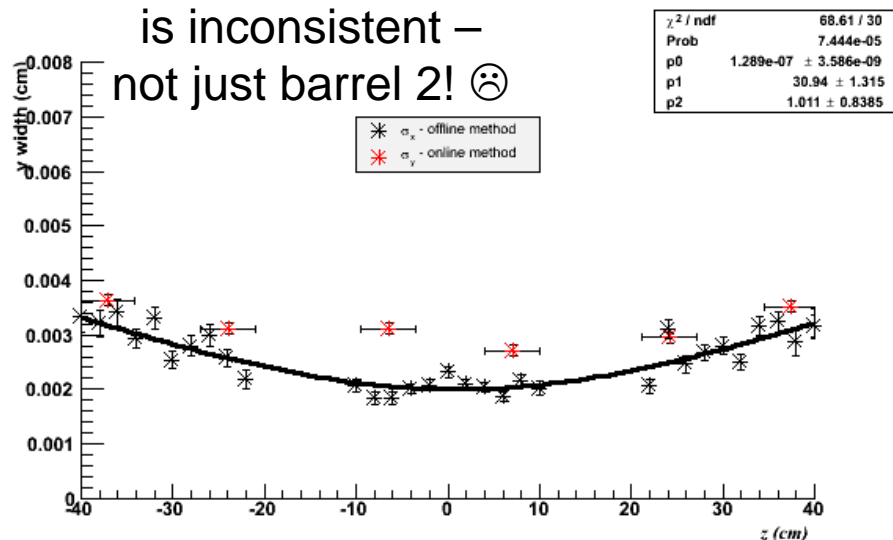
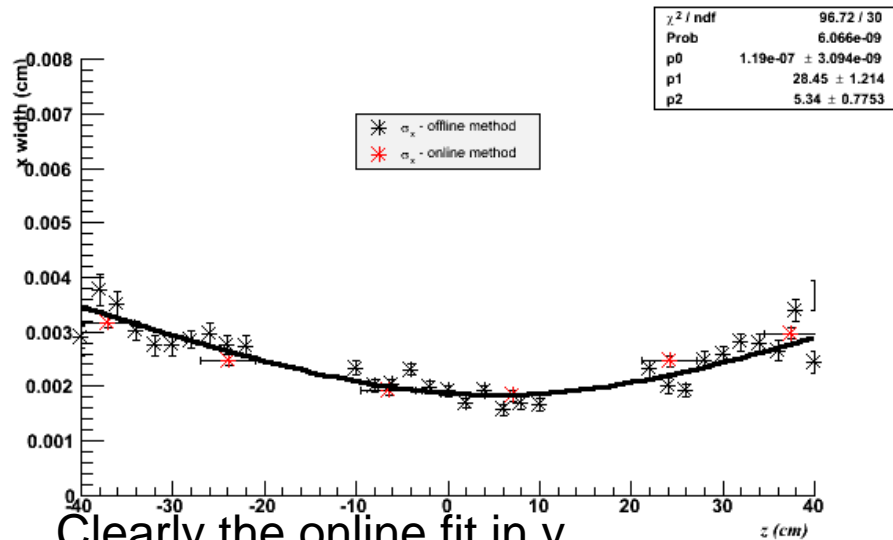
# Online beam width fit (2) – store 4556

✚ The barrel 2 outlier has been **taken out of the fit**.



# Beam width from on/off-line fit

— store 4481

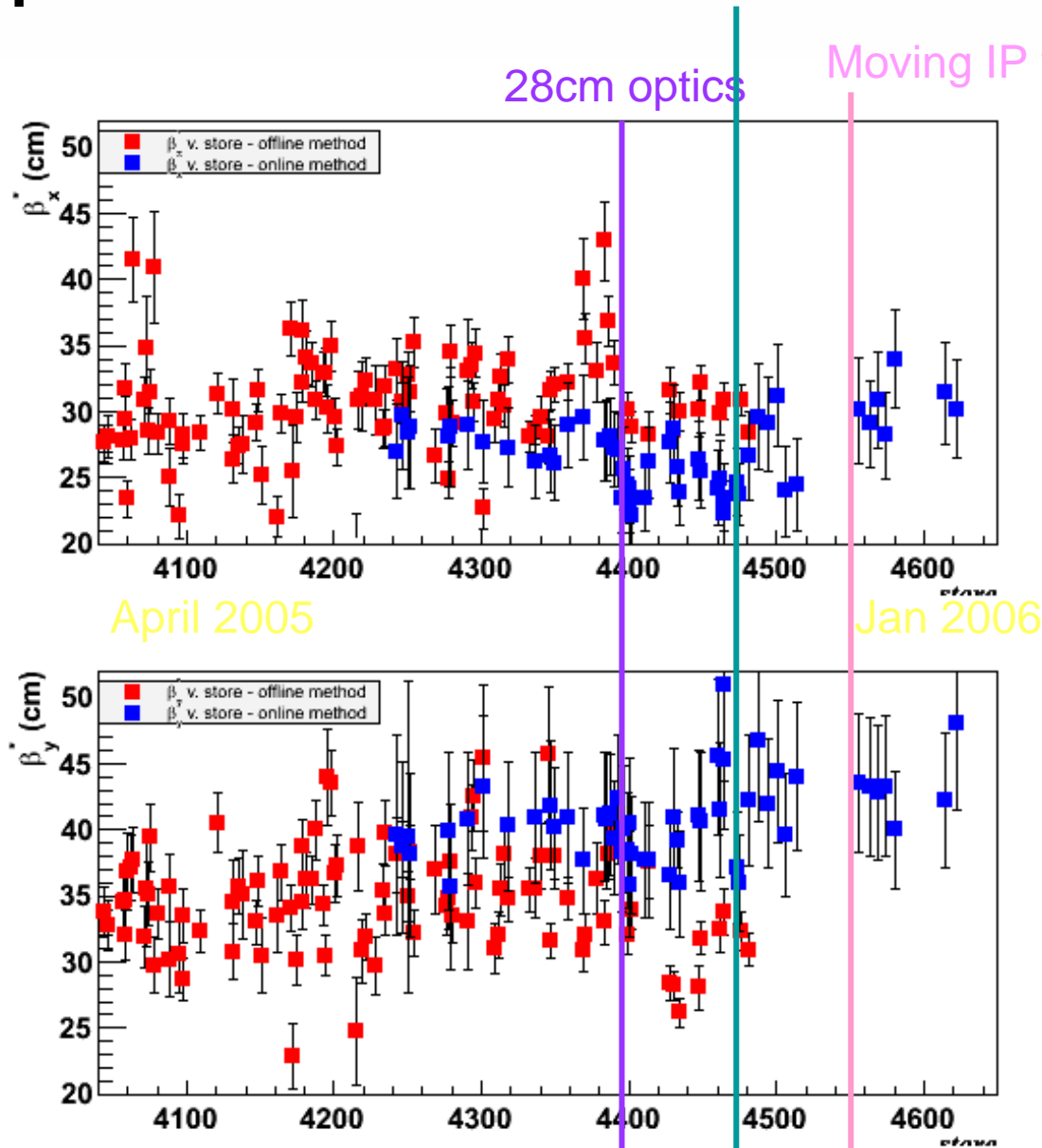


	Online	Offline
$b^*_x$	26.56 + -3.33	28.45 + -1.214
$e_x$	$1.22\text{e-}7$ + -7.2e-9	$1.19\text{e-}7$ + -3.1e-9
$z0_x$	1.19 + -1.81	5.34 + -0.78
$b^*_y$	42.24 + -4.95	30.94 + -1.32
$e_y$	$1.68\text{e-}7$ + -1.15e-8	$1.3\text{e-}7$ + -3.6e-9
$z0_y$	1.92 + -2.1	1.01 + -0.84

# History plot – $\beta^*$

Z0 moving at CDF/using improved z template

Offline(~4481)  
Online(~4623)

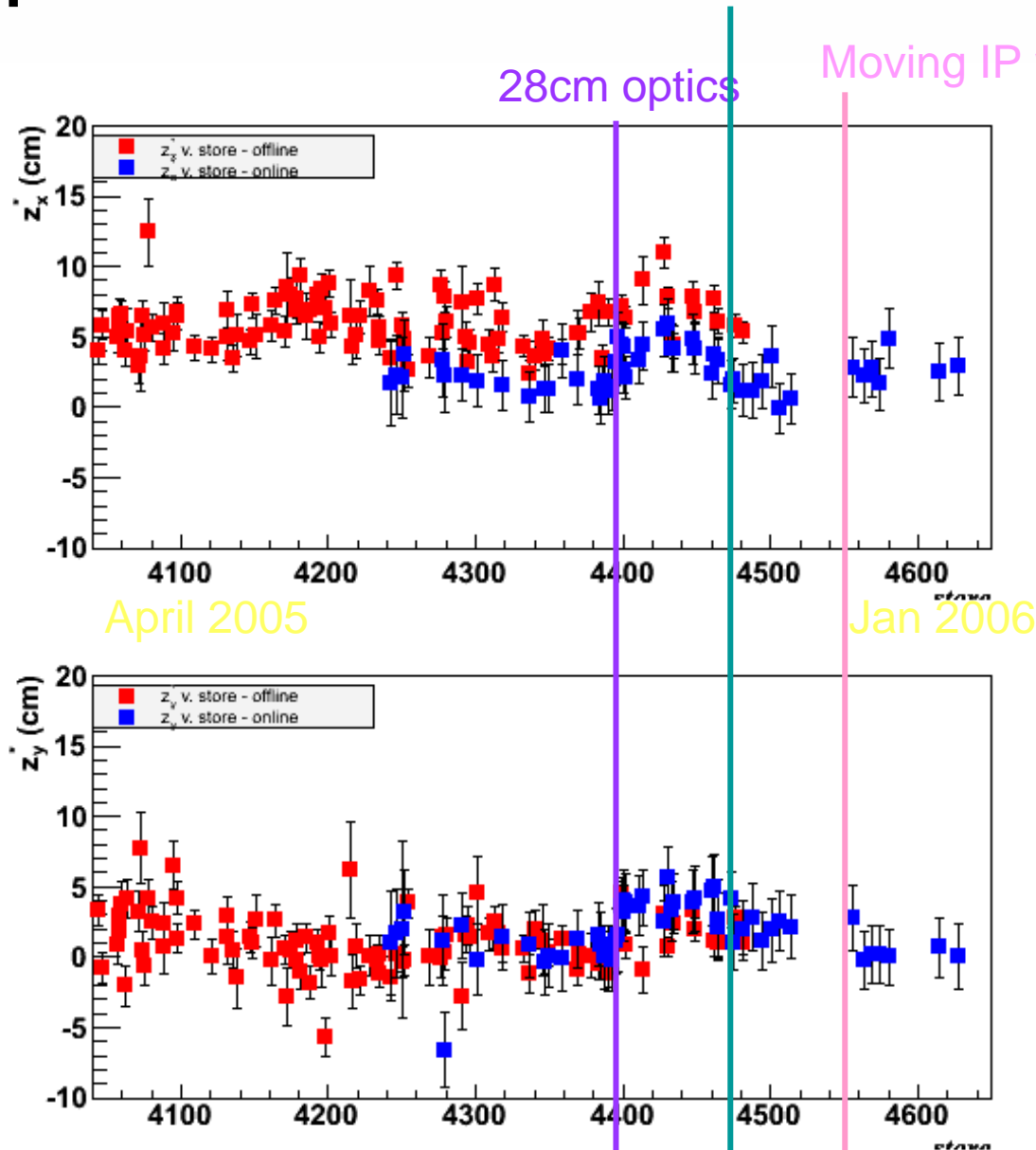


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# History plot – z0

Z0 moving at CDF/using improved z template

Offline(~4481)  
Online(~4623)

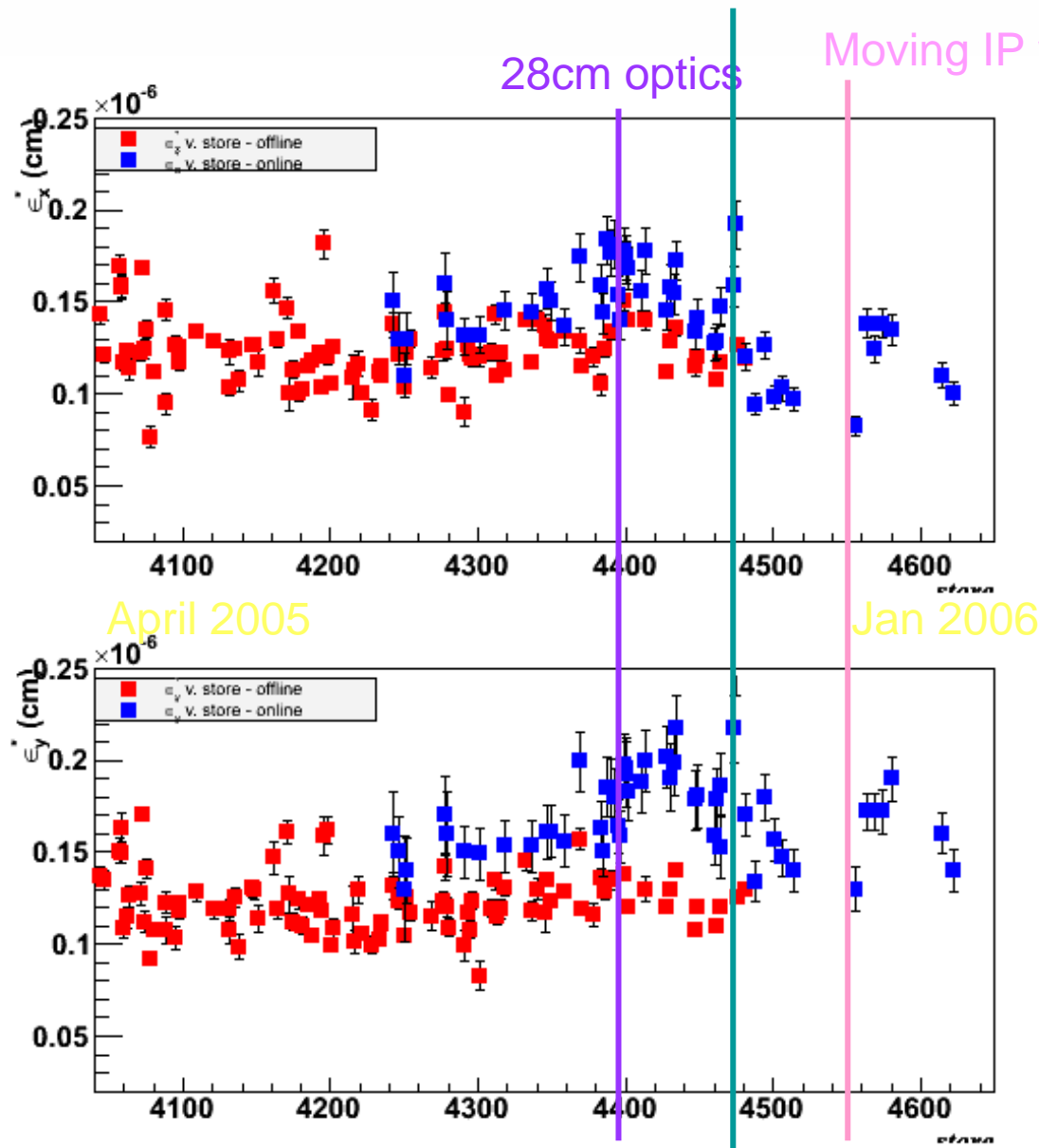


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# History plot - emit

Z0 moving at CDF/using improved z template

Offline(~4481)  
Online(~4623)



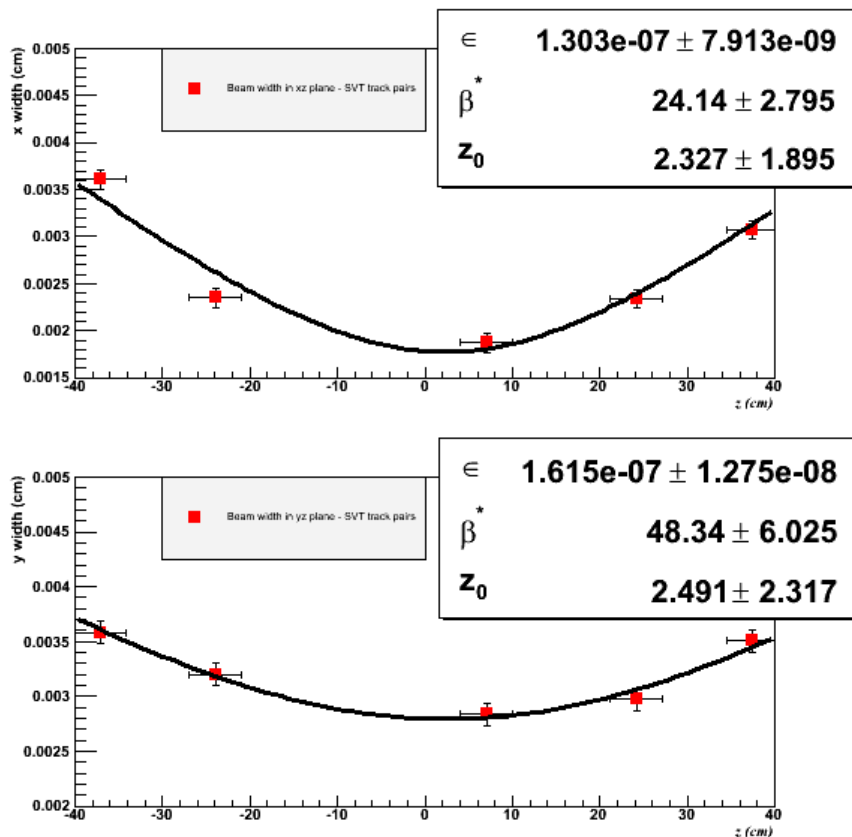
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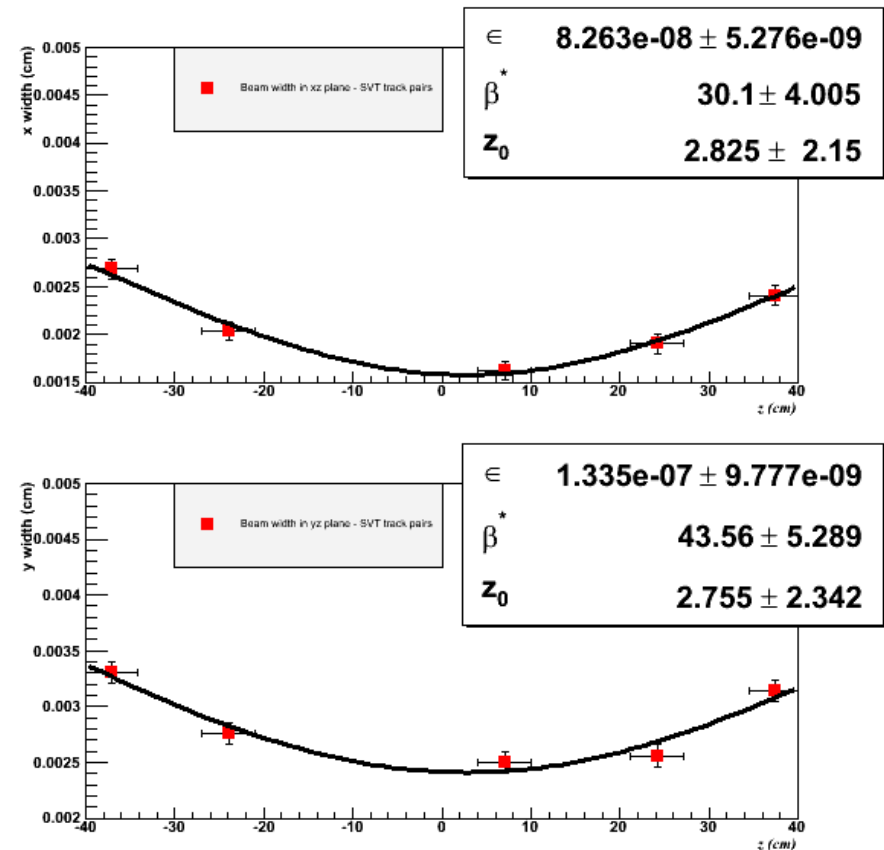
# IP waist moving during store4556

Online fits are not sensitive enough to see changes of order of  $\sim 1$  cm.

Before

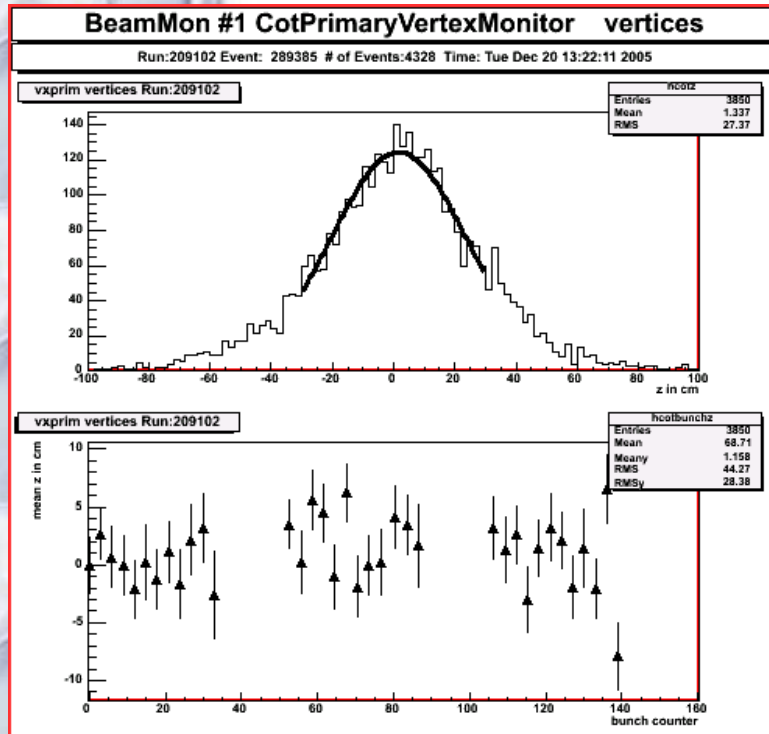


After

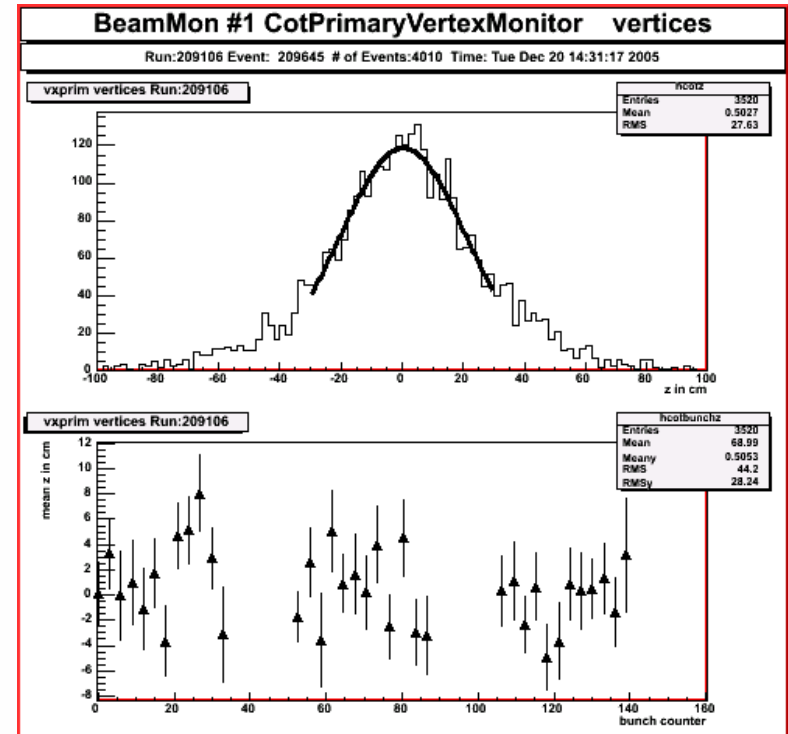


# Check IP waist moving from CDF online monitoring plot.

run = 209102 :  
mean =  $1.61657\text{e}+00 \pm 6.03723\text{e}-01$

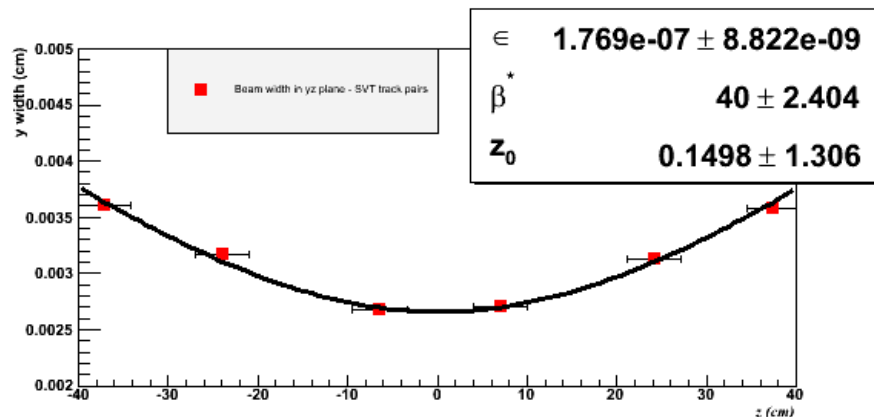
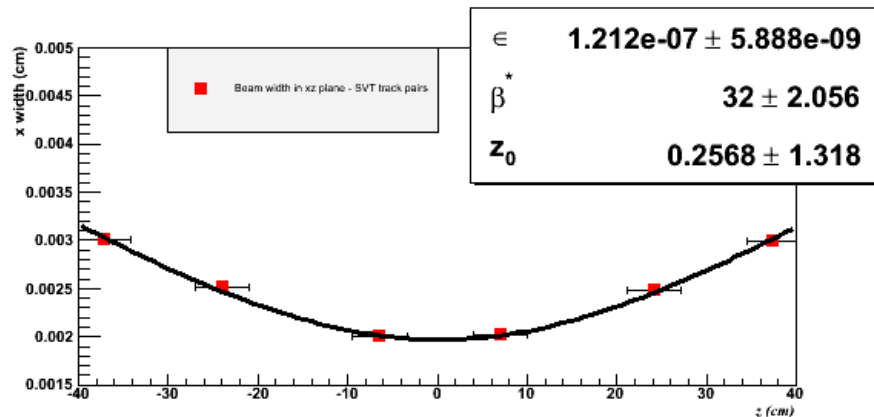


run = 209106 :  
mean =  $3.32255\text{e}-01 \pm 5.53305\text{e}-01$



# Barrel2 outlier - MC study

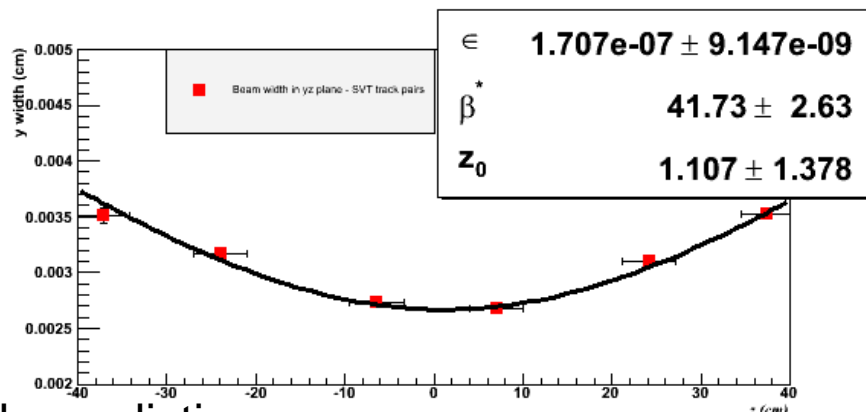
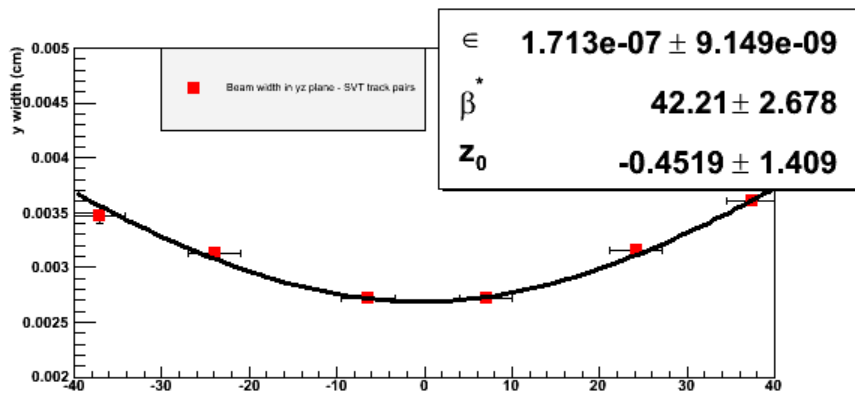
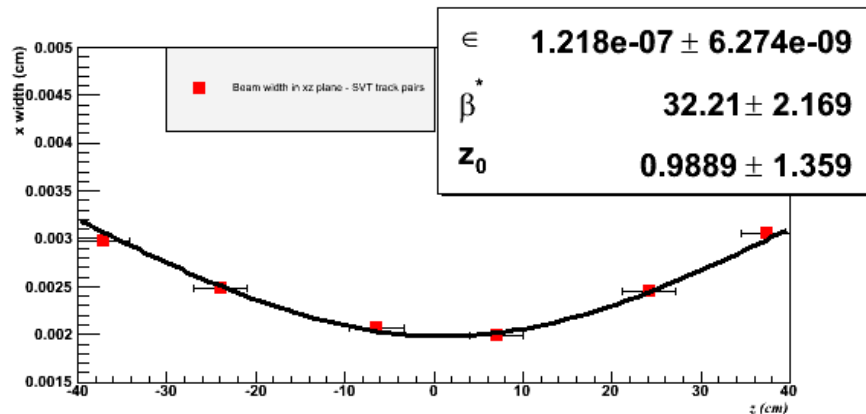
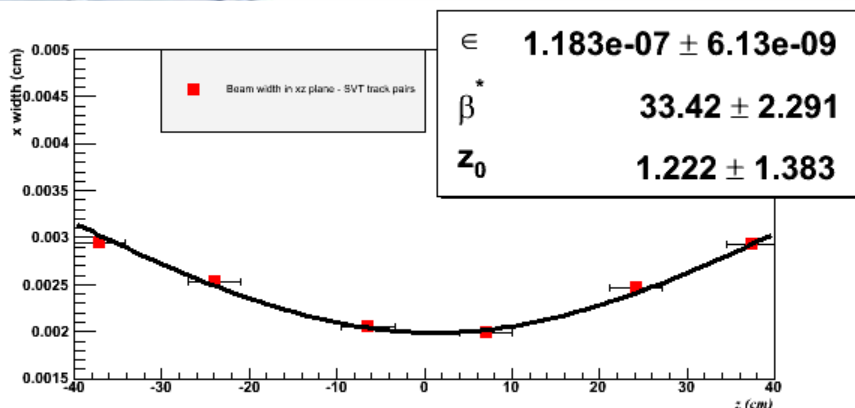
- We have **tried to reproduce barrel 2 outlier** in our random track generator.
- This plot shows the beam width from MC with consideration of flat phi occupancy of Silicon.
- **To be more realistic**, actual SVT occupancy was taken from two sources:
  - online beam position monitoring
  - SVTD bank information (trigger info)



# Barrel2 outlier – MC with SVT occupancy

online beam position monitor.

SVTD bank



❌ Could not reproduce the outlier with the realistic occupancy

❌ Idea: improve track & event selection to be less sensitive to fake tracks – will test soon

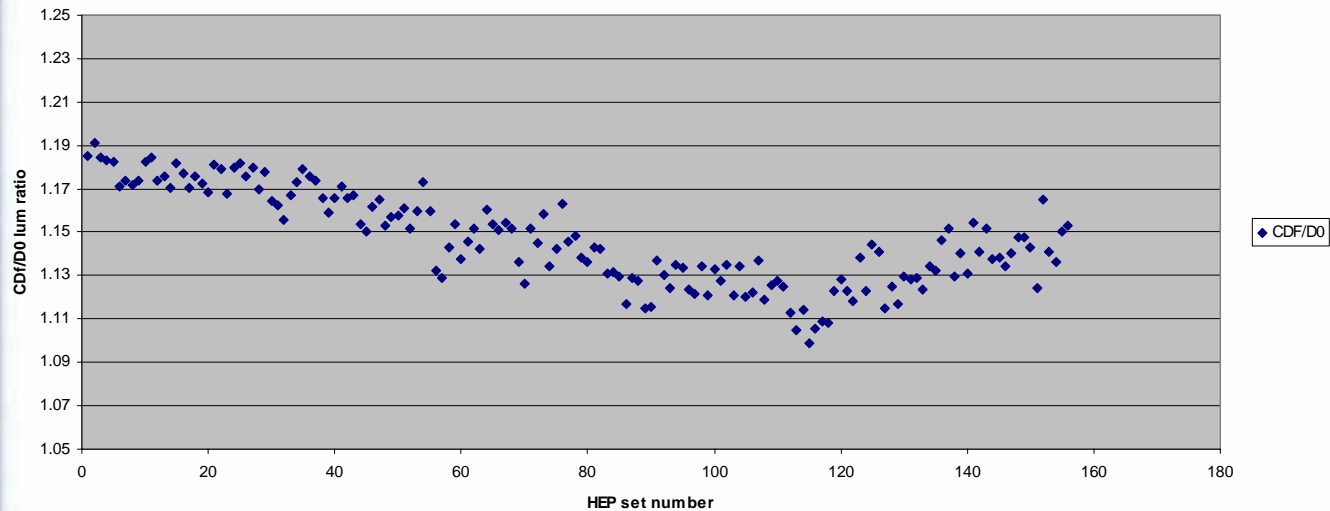
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Joint Luminosity Meeting

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# Beam parameter during store4514

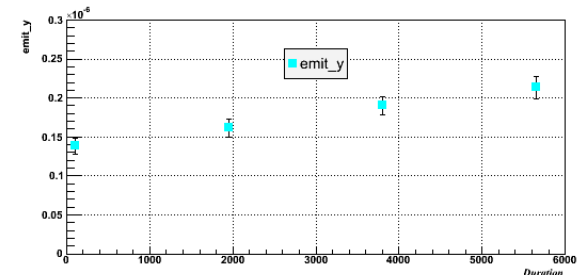
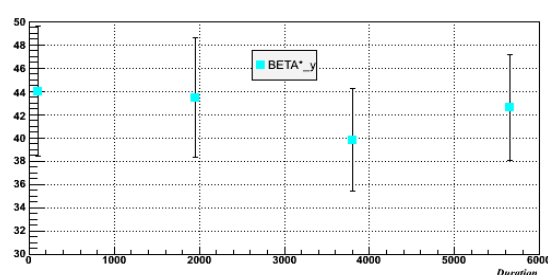
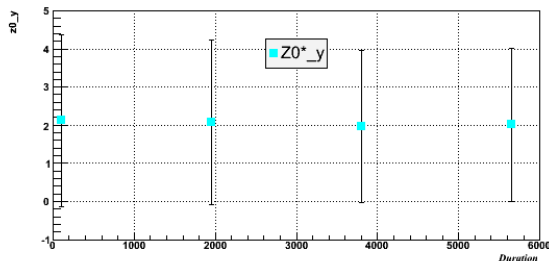
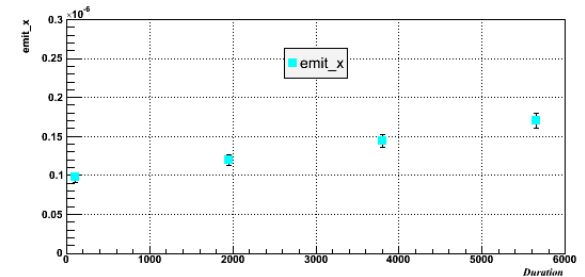
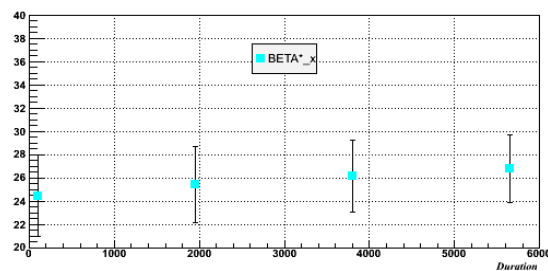
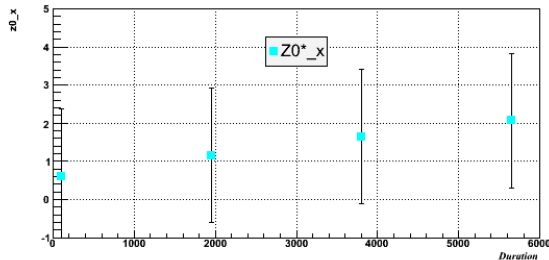
CDF/D0 ratio into store vs HEP set number - 451



Z0

B\*

emittance



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# Summary

- ✱ Online beam width fit, especially in y direction, needs to look at.
  - ✱ New z template is used since Nov 2005.
  - ✱ Barrel2 was taken out.
  - ✱ MC cannot reproduce the outlier.
  - ✱ Online beam width code test with improved selection is coming soon.
- ✱ There have been changes in the second half of last year which are seen in history plot:
  - ✱ IP waist moved in Dec 20. 2005.
- ✱ Beam parameters were checked with time during 4514.